

First Record of the Smooth-Backed Parachute Gecko *Ptychozoon lionotum* Annandale 1905 from the Indian Mainland

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Abstract.—The smooth-backed parachute gecko, *Ptychozoon lionotum* is reported from the mainland India for the first time. The nearest known previous record was from Pegu, Myanmar, about 700 km southeast of the previous location. The species was collected in Langtlai and seen in the Ngengpui Wildlife Sanctuary, both in south Mizoram. The collected individual was kept in captivity for four and a half months. During this time, opportunistic observations on activity pattern, food habits, escape and parachuting behavior were made. Both individuals showed slow, deliberate pre-escape movement previously unrecorded for *Ptychozoon*. Information on morphological characters and morphometric measurements is presented. Explanations for the disjunct distribution are discussed.

Key words.—Reptilia, Gekkonidae, *Ptychozoon*, parachute gecko, Northeast India, Myanmar, distribution, biogeography, behavior

Ptychozoon is a genus of arboreal geckos distributed over much of Southeast Asia, primarily in moist tropical evergreen and semi-evergreen forests (Brown, 1999; Brown *et al.* 1997; Smith, 1935). At present, six species are recognized under the genus: *Ptychozoon kuhli*, *P. horsfieldii*, *P. lionotum*, *P. intermedium*, *P. rhacophorus* and *P. trinitaterra* (Brown *et al.*, 1997; Brown, 1999). To date, the only species reported for India is *Ptychozoon kuhli*, from the Nicobar Islands (De Rooij, 1915; Smith, 1935; Tiwari, 1961). We present here the first record of the smooth-backed parachute gecko *Ptychozoon lionotum* based on two records from the state of Mizoram (21°56'N to 24°31'N and 92°16'E to 93°26'E) in Northeastern India (Fig. 1).

The first individual was sighted on 29th June 1998 in Lawngtlai town of south Mizoram during a short survey. Subsequently, on 21st April 1999, a second individual was sighted by SP from the vicinity of Ngengpui Wildlife Sanctuary (NWLS; 22°21'24" N to 22°30'06" N and 92°45'12" E to 92°50'20" E) in south Mizoram, during a herpetofaunal community study (Pawar, 1999). We could only collect the first individual, and although SP could get a superficial look at the second one before it escaped (see below), we presume that it was the same species as the straight-line distance between the two sites is only about 40 km. Both the localities lie in the low to mid-elevation region of south Mizoram. The vegetation is of the tropical (moist) evergreen type, corresponding to Northern Tropical Evergreen Forest (1b/c2; Cham-

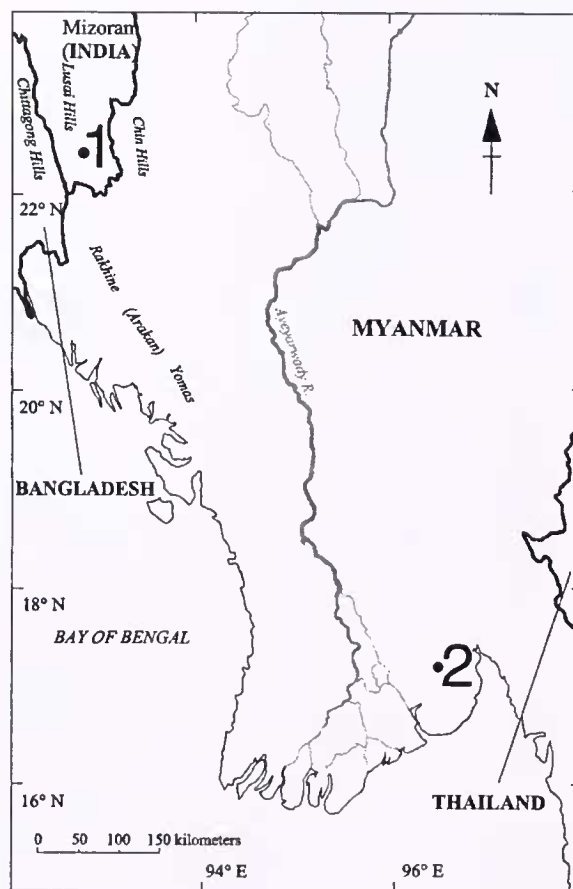


Figure 1. Present record (1) of *Ptychozoon lionotum* (BNHM 1445) from south Mizoram (India), along with nearest previous record (2) from Pegu (Myanmar).

Table 1. Mensural (in mm) and meristic measurements of two specimens of *Ptychozoon lionotum*. The vouchered record reported here (BMNH 1445) is compared with one of the syntypes (ZSI 2601). The latter specimen was fully discolored and severely mutilated so many characters were not discernable (NA) and so measurements beyond mm were not possible.

Character	BNHM 1445	ZSI 2601
Head length	16.8	15
Head width	16.8	16
Head height	12.7	11
Eye diameter	4.8	NA
Eye to nostril distance	8.2	NA
Eye to snout distance	11.3	11
Eye to ear distance	7.7	8
Inter orbital distance	10.3	NA
Inter narial distance	3.7	NA
Tympanum diameter	2.3	3
Neck length	11.9	NA
Snout to forelimb length	36.0	NA
Axilla to groin length	47.0	42
Body flap width (Greatest width from base of flap to tip)	8.1	9
Body flap length (From axilla to groin)	39.6	41
Fore arm length	18.7	12
Fore limb length	27.8	21
Femur length	13.6	NA
Tibia length	12.7	NA
Hind leg length	22.9	20
Hind foot length	39.6	37
Length of I st Toe	6.3	NA
Length of IV th Toe	9.4	NA
Snout to vent length	94.6	88
Tail length	93.0	NA
Tail width	7.6	NA
Tail depth	6.3	NA
Terminal tail flap length	20.1	NA
Terminal tail flap width	10.9	NA
Supralabials	10/11	NA
Infralabials	9/9	NA
Transverse dorsal bands in the axilla-groin region	4	NA
Number of lobes fused before straight flap	7	NA

Character	BNHM 1445	ZSI 2601
Supranasals in contact	No	NA
No. of tail lappets	19	NA
Subdigital lamellae (L/R)		
Finger I	11/10	NA
Finger II	11/13	NA
Finger III	12/16	NA
Finger IV	15/15	NA
Finger V	14/14	NA
Toe I	11/11	NA
Toe II	12/12	NA
Toe III	16/15	NA
Toe IV	14/14	NA
Toe V	14/14	NA

pion and Seth, 1968) and Chittagong Tropical Evergreen Forest (1b/c4; Wikramanayake *et al.* 1998).

Identification of the species as *P. lionotum* is based on the presence of the following combination of characters: absence of enlarged tubercle on the dorsum; denticulate tail lobes of the tail directed somewhat backwards; tail not tapering (Smith, 1935); presence of pre-digital notch on the forearm skin fold (Brown, 1999; Brown *et al.* 1997; Cox *et al.* 1998). We also compared our specimen with one of the syntypes of *P. lionotum* (ZSI 2601, from Pegu, Myanmar) and a specimen of *P. kuhli* (ZSI 2603, from Nicobar Islands) housed at the National Zoological Collection of Calcutta. Selected morphometric measurements (after Brown, 1999; Brown *et al.* 1997; Das, 1997; Ota, 1989; Zug and Moon, 1995) were recorded using Mitutoyo Digimatic callipers, with an accuracy of 0.1 mm (Table 1).

The color pattern of the specimen (in life) was as follows (Fig 2): Dorsally medium to dark gray with darker markings; dermal appendages lighter in color, mottled; distinct wavy dark, grayish-brown transverse bands present, four between the axilla and groin; chin and gular region dirty white to yellowish, white on chest, belly and underside of tail heavily powdered with gray-brown; underside of thighs, arms and dermal appendages was similar to gular region in color. The collected individual showed some degree of color change in captivity, ranging from light (bands distinct) to dark gray (bands barely distinct).

The individual was judged to be an adult female based on the absence of preanal and femoral pores

and the lack of hemipenial swellings at the tail base. The sex was later confirmed by dissection.

The individual was kept in captivity in a glass terrarium measuring 2x1x1.5 ft, for four and a half months. During this period, we frequently took the gecko out at different times of the day, which allowed us to make additional behavioral observations, including those on its escape and parachuting behavior. The specimen was later euthanized and preserved in 70 % ethanol after fixing in 10% formalin, and deposited in the reptile collection at the Bombay Natural History Museum (BMNH fide Leviton *et al.*, 1985) in Mumbai (No. 1445).

Natural History and Behavior

A mosaic of bamboo-dominated patches, remnant mature forest, teak plantations and jhum fallows of varying ages surround the town of Lawngtlai (900–1000 m elevation), where the first individual of *Ptychozoon* was seen. At 1930 hrs on 29th June 1998, the parachute gecko was seen in a circuit house situated in the outskirts of the town. It was resting on the inside ledge of a window in the corridor, at a height of about 2 m from the floor. The corridor was enclosed, the only entry points being the windows and the doors at the ends of the passage. In the same passage, there were a few *Hemidactylus frenatus*, while a nearby corridor was occupied by *Cosymbotus platyurus*. While resting, the dermal appendages of the parachute gecko were closely apposed to the body, and it did not show any movement, except for a vigilant but sluggish lateral movement of the body towards the outside of the ledge when attempts were made to capture it.



Figure 2. *Ptychozoon lionotum* (Adult female, BNHM 1445) from Mizoram, northeast India.

On 6th April 1999, SP, along with his field assistant, spotted the second *Ptychozoon* at 1820 hrs, next to a dirt track in a patch of mature evergreen forest south of NWLS boundary, ~40 km (straight-line) south of the first locality. NWLS is the only remaining patch of unfragmented, mature primary forest in the area, characterized by a three-tiered structure, with towering, buttressed, deciduous emergents up to 50–60m in height, followed by middle and tertiary canopy trees (Pawar, 1999). This area, especially the Ngengpui valley, experiences five rainless months, but the effective dry period is much shorter, with humidity being consistently high during these months due to fine, localized precipitation from cloud and fog. This individual was smaller than the first one and was spotted at a height of 5 m on the trunk of a *Sterculia scaphigera* tree. The tree is characterized by a deeply fluted trunk and a smooth but slightly flaking bark, and occurs as a deciduous canopy-emergent in pri-

mary evergreen forest above 500 m elevation. The patch of forest was on a slope at an altitude of approximately 450 m, and the tree (385 cm in girth at shoulder height) was towards the edge of the patch, slightly down slope, about 3 m from the dirt track and the observers. The gecko was sitting on the outer ridge of one of the trunk folds with its head pointing downward, barely visible on the lichen-covered bark. It was twilight, and upon sighting it, SP observed the animal for about a minute with the aid of a torch and binoculars before attempting to capture it. Meanwhile, the gecko had apparently become wary and steadily started moving laterally in the manner of the first individual away from the two observers, towards the other side of the trunk and out of sight. When SP tried to dislodge the gecko with a bamboo pole, the animal rapidly moved further around the trunk. It then jumped onto some lianas which were 2.5 m from the trunk, landed 1.5 m lower than its previous position with its head up, ran further up and vanished into a mass of dry branches which were caught in the lianas. All further attempts to trace the gecko were futile, and we presume that either the gecko jumped on to another tree or liana, or fell to the ground somewhere down slope when the lianas were shaken to dislodge it. *Hemidactylus frenatus*, *H. garnoti*, *Cosymbotus platyurus* and *Gekko gekko* are four other gekkonines that were commonly seen in the same area.

During its four months of captivity, the individual was offered a variety of insects, of which it took cockroaches and moths most readily. In the daytime, it remained motionless, either on one of the branches in its terrarium, or on one of the tar strips at the corners of the enclosure. Towards evening however, it would become active, and was often observed moving around the terrarium, making audible leaps across the corners of the enclosure. When taken out, its behavior was very different during day and night. If kept on a branch or tree trunk in the daytime, it would remain motionless with its limbs closely apposed to the trunk, and move only if provoked. If not disturbed for a long time, it would start moving slowly with the same slow, deliberate movement that it had displayed during its capture, either out of sight to the other side of the branch/trunk, or run up the tree. In the evenings however, it showed much more alacrity in trying to escape, often with the same preliminary lateral movement of its body. On two occasions it also resorted to launching itself into the air, and when it fell to the ground, remained motionless. This escape behavior has been earlier observed in these geckos, and remaining immobile ostensibly makes it difficult to locate them (Brown *et al.*, 1997). However, the slow pre-

escape movement that we observed in both the specimens has not been reported before, and we reason that this behavior probably aids the gecko to position itself for parachuting or simply move out of sight (such as the blind side of a tree trunk) inconspicuously, without disclosing its crypsis. To gain further insights into this escape behavior that we observed in both the specimens, we dropped the individual on seven occasions from heights of 3–5 m and observed its behavior. In all instances, the dermal appendages came into play apparently due to air resistance, and the gecko dropped relatively softly on the ground without any horizontal displacement.

The ecology and behavior of species of *Ptychozoon* is poorly known, and there has been much discussion about its alleged ability to “glide” (Günther, 1864; Smith, 1935; Tiwari, 1961 and references therein). It has been argued that the dermal appendages do not help in gliding, but enhance its camouflage. However, experimental studies have now demonstrated that the dermal appendages do allow the gecko to take advantage of air resistance while making long sallies (Heyer and Pongsapipatana, 1970; Marcellini and Keefer, 1976) and may serve a dual function in crypsis and escape or locomotion (Marcellini and Keefer, 1976). Recently, Brown *et al.* (1997), based on their observations of the escape behavior of *P. intermedium* in the wild, have argued that “parachuting” is a more appropriate term than “gliding” to describe this behavior in these geckoes. Our observations apparently sustain the arguments of Brown *et al.* (1997). Further studies on the preflight behavior of *Ptychozoon* species may provide interesting insights into the escape behavior of this extraordinary group.

Biogeographical Notes

The syntype (ZSI 2601), collected by Major Beddome and W. Theobald from Pegu in south Myanmar, was previously the northwestern most distribution record of *Ptychozoon* (Annandale, 1905; Brown *et al.* 1997). The present record thus adds a crucial link to the distributional information for the genus, and increases the known range ca.700 km towards the northwest. This also adds another case of range disjunction in a region that already has numerous examples of taxa showing dramatic discontinuities in their range (Mani, 1974).

After the collision of the Indian plate with the Asian mainland in the Eocene (54–36 mybp) (Molnar and Tapponnier, 1975), Indo-Malayan faunal and floral elements have colonized different parts of the India, resulting in more Indo-Malayan faunal representatives within India than vice versa (Das, 1996; Mani, 1974). Geckos are notorious for their penchant

for waif-dispersal (Case *et al.* 1994). It has been observed that *Ptychozoon* species are not obligate forest dwellers (Annandale, 1904; Brown *et al.* 1997), and probably are capable of dispersing through both forest and human inhabited areas (Annandale 1904; Brown *et al.* 1997).

Mizoram is dominated by the Lushai Hills, a series of parallel hill ranges running from north to south and increasing in elevation from west to east (Pachuau, 1994). To the west of these hills lie the Chittagong Hill tracts of Bangladesh, and to the east lie the Chin Hills and the Arakan Yoma mountain ranges of Myanmar. The latter, also running in a north-south direction, lie between the lowland moist evergreen forests of south Mizoram and Pegu. Along the foothills of the Arakan Yomas, flanking the western side, lie more or less contiguous rainforests, which forms a habitat bridge between these two areas (Collins *et al.* 1991). It is likely that this species has extended its range northwards along this route. This conjecture will get firmer footing if surveys in these forests reveal the presence of *P. lionotum* along these tracts. The areas beyond the Lushai Hills of Mizoram and the adjoining Chin Hills of Myanmar in contrast, are more arid with relatively dry forests. Moreover, recent surveys have not revealed the presence of *Ptychozoon* species in these areas, and it is unlikely that it exists there (George Zug, *pers. comm.*).

Our inquiries revealed that not many local people know of this gecko, but those who did, opined that it was rarely seen because it mostly “lived high up in the trees”. There have also been unconfirmed reports of a parachute gecko from north Mizoram (Lal Ramthanga, *pers. comm.*). That this area has been inadequately surveyed is evident from the fact that the six-month herpetofaunal study conducted by SP yielded a number new taxa and distributional records (Pawar, 1999). Further exploration will probably reveal that *Ptychozoon* is present in other parts on this region, and its range may not be as disjunct as it appears now.

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